

3.0 OLD HORN SITE – 430 ISLETA BOULEVARD, SW NMED Facility Number 301002

3.1 INTRODUCTION/SITE HISTORY

The Old Horn Site (the Site) is located at 430 Isleta Boulevard. Hydrocarbon releases were first discovered in the Old Horn Site vicinity when the owner of a mobile home park, Mr. C.O. Clark, complained of gasoline odors in his water supply well. Subsequent sampling of the well by the Albuquerque Environmental Health Department (AEHD) in 1991 identified trace levels of BTEX compounds in the well.

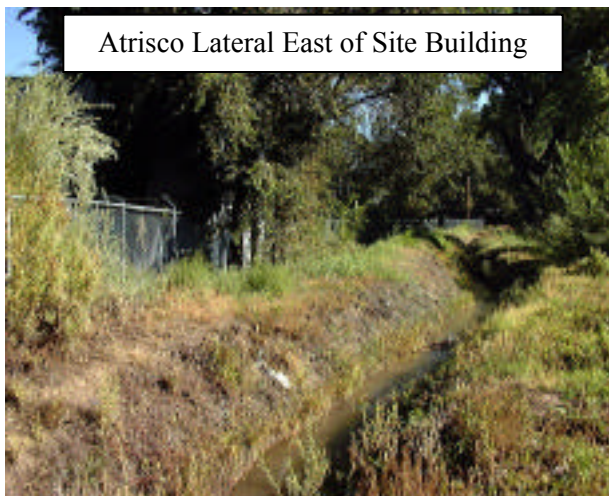


Former Old Horn Service Station looking NE

Based on a comprehensive review of available historical data, past Site knowledge, and completion of a detailed site inspection, FEI/TPA presents the following site summary. In addition, detailed maps were constructed summarizing known Site conditions (Figures 3A, 3B, and 3C).

- The Site has been the location of a series of gasoline service stations from the 1940's through the mid-1980's when any remaining USTs were reportedly removed from the Site. Like many of the older Isleta Sites, the Old Horn Site has experienced a complicated history of investigation and remediation activities.
- Initially, Western Technologies, Inc. (WTI) was retained by Mr. Calvin Horn to complete an On-site Investigation at the Old Horn Site. In January of 1992, WTI advanced and sampled three monitor wells and over 20 shallow soil borings in the Site vicinity (Figure 3A). Data collected during WTI's investigation revealed the presence of an extensive soil hydrocarbon plume with moderate levels of ground water BTEX. Although many borings were installed during this investigation, no laboratory TPH samples were collected and the boreholes were not continuously cored. Furthermore, the majority of soil headspace screening was conducted using an HNU-brand model 101 PID. This brand of PID has been shown by AEHD and NMED to underreport moderate to high levels of total ionizable volatile compound (TIVC) concentrations. For this reason, PID readings obtained with an HNU are presented as minimum values on Figure 3A.

- In early 1992, the NMED placed the Old Horn Site on its list of state-lead GWPA sites. Monteverde Environmental Consultants, Inc. (Monteverde), was retained by NMED to complete investigation activities and design and install a remediation system. Between 1992 and 1994, Monteverde installed and sampled additional monitor wells and soil borings in the Site vicinity. Exact locations for these drill holes could not be determined by FEI/TPA. The Monteverde base maps provided in their Hydrogeologic Investigation and Geotechnical Investigation Reports are an enlarged 1:24,000 scale USGS topographic map with the drilling locations drawn in by hand and a hand drawn base map. During this same period, Monteverde reported to have excavated approximately 250 cubic yards of soil from the former tank excavation area and installed a passive venting/active sparging in-situ reclamation system in the southernmost portion of the Site. An as-built report for this system was not identified in the NMED case file; however, the Monteverde system is discussed later by NMED's next consultant, Intera, Inc. (Intera). The approximate location for this reclamation system is shown in Figure 3C. Very little is known of its construction. This system was apparently never operated. Additionally, Intera reported that Monteverde also installed four pilot test wells, which were also never operated. No evidence of these pilot test wells was observed during FEI/TPA's site inspections in June and July of 1999.
- Intera was retained by NMED-USTB in late 1994. They conducted additional site investigations and installed additional wells and soil borings, which provided a more detailed understanding of the Site. Their investigations focused on the southern half of the Old Horn Site, which is believed to have been the area most highly contaminated.



- Shallow ground water flow has been calculated to flow south at a gradient of approximately 10^{-3} to 10^{-4} feet/foot. Depth to ground water is approximately 12 to 13 feet below ground surface (bgs). The Atrisco Lateral unlined irrigation canal is located immediately to the east and south of the Site. The lateral appears to effect ground water flow locally and cumulative ground water quality data suggest it has acted as a partial barrier to downgradient plume migration. However, additional down-gradient monitor wells are needed south of the lateral.
- Site geology appears to be primarily a coarsening downward sequence consisting of silts and clays grading to sands and gravelly sands at and above the water table. As part of our site review, FEI/TPA completed the cross section shown in Figure 3B using data obtained from WTI, Intera, and Monteverde drilling information. Additional cross sections for the locations shown in Figure 3A are

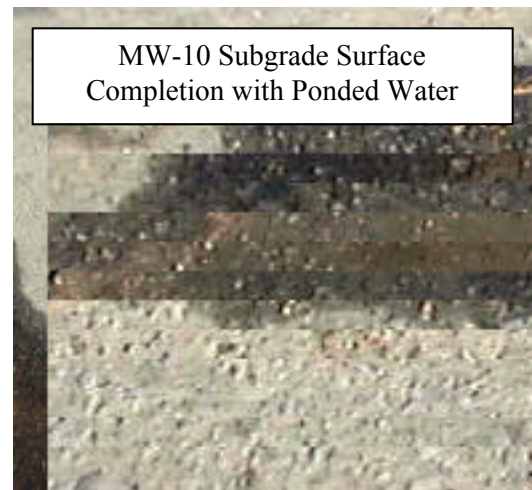
not included in this workplan and budget. The cross sections shown on Figure 3B provide further information regarding the site geology and contaminant distribution.

- Soil hydrocarbon impacts, as documented by PID and laboratory TPH soil analysis, suggest that several releases have occurred at the Old Horn Site, both from surface releases and from the former UST systems. Soils exceeding USTR standards appear to extend across an area of more than 400 feet by 200 feet in size (Figures 3A and 3C). Surface releases are suggested by the presence of soil impacts extending from the land surface to the water table. UST system releases are suggested by the presence of hydrocarbon hot spots in the vicinity of the former tank systems. Previous sampling identified the presence of gasoline and minor diesel range hydrocarbon Phase Separated Hydrocarbon (PSH) in the vicinity of monitor well MW-10 and gasoline range-only PSH in the vicinity of monitor well MW-1B. The PSH identified in MW-10 appears significantly more degraded than the PSH found in MW-1B.
- Intera conducted a short-term AS/VE pilot test at the Site in November 1994. The pilot test consisted of installation and operation of a single dual-completed sparge and vent well (shown as #7 on Figure 3C). This well was installed at a location equidistant between MW-10 and SB-A (Figure 3A). Four 1" diameter galvanized iron pipes (vacuum observation points) were driven into the ground at distances of 8', 19', 23', and 30' from Well Nest #7. The location of these wells and whether just the open end of the pipe or a screened interval was used to measure vacuum responses is unknown, based on available data. Intera calculated a radius of influence based on their pilot test of 45 to 55 feet. Our analysis suggests the effective zone of vacuum influence (EZVI) for the test well is approximately 30 feet. This assumes a 3% normalized response, which we have used to define the EZVI. Off-gas emission concentrations based on laboratory analysis of a single recovered vapor sample were approximately 16,000 ug/l (3700 ppm/v). Total BTEX concentrations amounted to less than 400 ug/l (90 ppm/v)
- The Pit Stop leaking UST site is located approximately 500 feet to the north. The former Phil's Auto leaking UST site is located approximately 1000 feet to the south of the Site. Long-term ground water quality data indicate neither of these plumes appears to have impacted or co-mingled with the Old Horn plume.
- In 1995, Intera installed 14 AS/VE well nests and associated subgrade piping in the southern portion of the Old Horn Site (Figure 3C). These wells apparently have never been operated. Inspection of the Site by FEI/TPA in 1999 identified the primary subsurface PVC manifold headers for the system in the southernmost portion of the Site (see Photograph). Review of the Intera Reclamation Proposal confirms that the treatment wells are manifolded in such a way



that each “leg” of the system can be turned on or off, however, individual well control is not possible.

- Each sparge and vent well nest is reportedly completed with the sparge and vent well in the same borehole. Bentonite seals reportedly isolate the screened intervals of each well cluster. Surface completions allowing access to the AS/VE wells were not constructed and all wells and piping are subgrade. Vent wells are reported to be constructed of 2” diameter schedule 40 PVC with 0.02” slot screen and sparge wells are constructed of 2” diameter schedule 40 PVC with 0.01” slot screen. According to the Intera Reclamation Proposal, the well screens are backfilled with crushed gravel. Horizontal piping in the vicinity of the manifold valving is 3” diameter PVC. The current condition of the subgrade treatment system is unknown.
- It should also be noted that many of the original monitor wells installed at the Site have been damaged, destroyed, or lost (Figure 3A). Some surface well completions, such as MW-10, are set into the surrounding asphalt and tend to accumulate surface water runoff during the wet season.
- Following installation of the AS/VE system, two ground water-sampling events were conducted at the Site; one in 1996 and one in 1998. These data document reductions in dissolved phase BTEX and PSH in select wells (Figure 3A).
- Initial sampling of monitor wells MW-1, MW-2, and MW-3 by WTI in 1992 identified the presence of BTEX and methyl-ethyl-ketone (MEK) and acetone at levels of up to 590 ppb each.



3.2 EXISTING SITE CONDITIONS

Based on the above data, the following deficiencies need to be addressed:

- Although many previous boreholes were installed in the Old Horn Site vicinity, the data collected during these investigations is either out-of-date or incomplete. The presence of multiple release(s) has likely complicated the pattern of contamination at the Site. Many of the original monitor wells are destroyed and/or unusable. Much of the northern and western portions of the contaminant plume are incompletely characterized. TPH soil samples were collected from the Site during the Intera investigation only. The Site needs to be re-sampled for the presence of MEK and Acetone.
- The western and southern extents of ground water hydrocarbon impacts have not been characterized.

- The original Monteverde remediation system appears to have major vacuum leaks in piping and/or treatment wells based on limited testing of the system by Intera. FEI/TPA does not recommend use of this system without further examination. This system should be properly plugged and abandoned.
- The Intera AS/VE system needs to be inspected to determine system status after 4 years of abandonment. Repaving of portions of the site with asphalt may have resulted in damage to horizontal piping runs and wells.
- Vacuum short-circuiting in the subsurface is likely to be a problem for future remedial activities unless existing non-usable reclamation system components are properly plugged and abandoned.

3.3 RECOMMENDED ACTIONS

Task One – Site Review and Work Plan Development

This task provides for the review of NMED/USTB files, site mapping and photography, review of historic ground water and soils data, and final preparation of this work plan for additional investigation.

Task Two - Sample Existing Wells and Conduct Three Additional Quarterly Sampling Rounds

Ground water in all usable wells (seven existing wells) will be sampled during an initial event for organic parameters including BTEX, MTBE, EDC, EDB, MEK, acetone, and naphthalene using EPA Method 8260. The following natural attenuation indicators will also be sampled for using field test kits: dissolved oxygen (DO), nitrate (NO₃), dissolved and total iron (Fe), alkalinity (HCO₃/CO₃), phosphate (PO₄), and sulfate (SO₄). Additional field tests will include pH, temperature, and conductivity. FEI/TPA will provide NMED/USTB and BCEHD 48-hour notification prior to initiating any sampling.

We also propose three additional quarters of ground water sampling for BTEX, TMB, EDB, EDC and MTBE using EPA Method 8021 (EDX) and for the above natural attenuation indicators. We propose sampling 9 wells in the second quarter, 12 wells in the third quarter and 9 wells in the fourth quarter.

During each sampling event ground water levels will be measured prior to sampling. Collected data will be used to define drilling locations as needed in Task Three below. New locks and well caps will be installed on all usable monitoring wells. Quarterly reports will be submitted according to the requirements of USTR §1216.

Task Three - Hydrogeologic Investigation

General - Characterize the magnitude and extent of soil and ground water contamination in the Site vicinity through advancement and sampling of soil borings and monitor wells. Tentative drilling locations are shown in Figure 3C. Off-site access will be required for several drilling locations. For the purposes of cost estimation and based on a comprehensive review of the Site data we propose the following number of soil borings and wells:

Projected Drilling Activity

- 20 - Soil borings
- 7 - 2" diameter shallow completion monitor wells
- 2 - 4" diameter Multi-Use Monitor/VE wells w/high flow screen (*see below*)
- 1 - 2" diameter deep completion monitor/AS well
- 6 - 1" diameter multiple completion pilot test wells (*see below*)

All soil borings will be sampled on a continuous basis using either 2-foot long split spoons or 5 foot long core barrels. PID headspace analysis will be conducted on retrieved soil samples at five-foot intervals or less and at the water table. One to two laboratory soil samples will be collected from each drilling location and analyzed for TPH (gasoline-diesel range) using EPA method 8015 modified and for BTEX and MTBE using EPA Method 8021. Samples will be collected for gasoline-range compounds using methanol extraction kits and unpreserved 4-oz jars for diesel-range compounds. New ground water monitoring wells installed during this task will be sampled and analyzed for the same EPA 8260 hydrocarbon parameters, natural attenuation indicators and field tests which were described for the initial well sampling in Task 2. Additionally, all new and existing wells will be surveyed to a common USGS (or other) established Mean Sea Level benchmark datum by a NM licensed surveyor.

We recommend conducting an AS/VE pilot test to evaluate the potential for upgrade of the existing remedial system. To minimize mobilization costs and maximize soil and groundwater data collection, we recommend that several of the proposed drilling locations be completed as multi-use 4" diameter wells and 1" diameter pilot vacuum test well clusters. Pilot testing will be conducted on the existing AS/VE remedial system and at newly installed high performance 4" diameter pilot test wells. FEI/TPA proposes the use of separate boreholes for completion of air sparging and vacuum extraction wells.

Aquifer Hydraulic Properties - Pursuant to the requirements of the USTR Part XII, Section 1210, FEI/TPA recommend evaluation of Site hydrogeologic properties through laboratory testing of retrieved sediment samples. Data collected from these activities will be used to determine grain size distribution, grain and bulk density, specific permeability (k) and effective porosity (n). Hydraulic properties such as storativity, transmissivity (T), and hydraulic conductivity (K) can then be estimated using sediment sample data. This information will then be used to calculate average ground water and contaminant migration rates, which are necessary in risk assessment calculations and/or determination of potential remedial alternatives. We recommend two monitor well locations to collect discrete sediment samples for laboratory characterization. Two samples will be collected from each location; one in the vadose zone, one in the shallow saturated zone. In addition to the above, two of the samples will also be analyzed for total organic carbon content (TOC).

We also recommend biological characterization of select retrieved soil samples for plate count analysis of total microbial populations and total hydrocarbon degrading populations in a laboratory setting. One

sample will be collected from the vadose zone and one from the phreatic zone. These data will provide useful information regarding the potential for enhanced biodegradation of hydrocarbons at the Site.

Repair Select Wells - Monitor wells MW-6 and MW-10 need their surface completions repaired. In addition, two 3" diameter PVC risers extending to ground water (?) are located in the general vicinity of MW-1. These may be old Monteverde pilot test wells and should be plugged and abandoned as they represent conduits for migration of surface contaminants to the water table.

Task Four - Completion of the Hydrogeologic Investigation (HI) Report

Upon receipt of all field data, FEI/TPA will prepare a summary HI report. This Report will include geologic and contaminant distribution cross sections, isoconcentration maps, a ground water isocontour map, appropriate tables, and text summarizing the results of the investigation as they relate to plume characterization and site remediation, and the requirements of the USTR. In addition, residual hydrocarbon spill mass estimates will be included.

Task Five - Conduct AS/VE Pilot Test and Evaluate Portions of the AS/VE remediation system. (Optional)

We recommend evaluation of the current condition of the AS/VE system, which has been abandoned in place for nearly four years. The condition of subgrade piping and the condition of treatment wells should be evaluated. We also recommend the implementation of a short-term AS/VE pilot test to better evaluate remedial alternatives, the effects of short-circuiting, well spacing/zone(s) of influence, process water generation vs. applied vacuum, flow and vacuum responses, and off-gas emission concentration and composition. Data collected during the pilot test will be used to aid in determining the best remedial approach for the Old Horn Site, which may involve upgrade and expansion of the existing remedial system. Due to the many site complexities, the pilot test will be conducted in two primary phases over a two-day period.

Phase One will consist of in-situ VE and AS testing on previously installed AS/VE well nest #6 and VE testing on one of the three manifold lines exposed along the southern portion of the property. Prior to testing, the well nest will be uncovered and the adjacent horizontal piping exposed in an effort to evaluate current well conditions and to allow for individual hookup to an above-ground VE blower and AS compressor. Using existing monitor wells in conjunction with proposed strategically placed vadose/phreatic zone 1" diameter vacuum monitoring well clusters will allow measurement of vacuum responses and sparging effectiveness on a three dimensional basis during each portion of the pilot test.

Initially, a vacuum will be placed on the VE portion of Nest #6 for a two-hour period. Surrounding wells will be monitored. Vacuum and flow will be increased in step fashion to evaluate optimal conditions and determine the breakthrough point for two-phase flow from the well. Once optimal flow conditions have been evaluated, air sparging will be initiated into the AS portion of Nest #6. Combined AS/VE will be continued for an additional 6-hour period. Following this primary test, vacuum and flow will be applied in a similar fashion to one of the vacuum lines for an additional two-hour period. The total test period for

the first day is projected to be approximately 10 hours. Dissolved oxygen concentrations will be measured in monitor wells during the test and after 24 hours. Four vapor samples will be collected in tedlar bags during day one and sent to the laboratory for TPH and BTEX analysis using EPA method 8015 modified and 8021. In addition, two samples will be analyzed for fixed gases and methane using standard EPA methodology.

Phase Two will consist of in-situ VE testing in VM-1, a newly installed high performance 4" diameter well, and combined in-situ AS/VE at newly installed wells, VM-2 and AS-1 (see above). Day two testing will evaluate the effectiveness of larger diameter, more efficient treatment wells at the Site. In an effort to evaluate the effects of lithologic heterogeneity across the Site, short-circuiting from the previously installed reclamation systems and potential zone of effectiveness beneath Isleta Boulevard, day two pilot testing will be conducted at two separate locations. Initially, vacuum and flow will be applied in VM-1 (Figure 3C). As presented above, vacuum and flow will be applied in a step-wise fashion to identify the most efficient operating configuration vs. water generation. Subsequently, a two-hour VE-only test followed by a combined 6-hour VE/AS test will be conducted in VM-2 (Figure 3C). This test will allow direct comparison of the high performance 4" diameter wells with earlier installed 2" diameter AS/VE well nests.

Dissolved oxygen concentrations will be measured in monitor wells during the test and after 24 hours. In addition, during the sparge portion of the test, a tracer gas (helium or sulfur hexafluoride) will be injected into the sparging well at a known concentration. Samples will be collected from the VE well using a field detector to evaluate flow and travel time characteristics at the Site. Four vapor samples will also be collected in tedlar bags during day two and sent to the laboratory for TPH and BTEX analysis using EPA method 8015 modified and 8021. In addition, two samples will also be analyzed for fixed gases and methane using standard EPA methodology.

**PRIMARY AREA OF SOIL
HYDROCARBONS (IMPACTED
SOIL COLUMN GREATER
THAN ~4 FEET IN THICKNESS
AT CONCENTRATIONS GREATER
THAN 500 PPM/V) (~18,000 ft2)**

EXPLANATION:

MW-4A Existing Monitor Well Location

Sampling Date	
B=	Benzene
T=	Toluene
E=	Ethyl Benzene
X=	Total Xylenes
TMB=	Tri-methyl Benzene
M=	(MTBE) Methyl-Tertiary Butyl Ether
All concentrations in Parts Per Billion (ppb)	

MW-4 Former Monitor Well Location (destroyed)

Previous Soil Boring Location

SVVS™ Well Location (approximate)

Monteverde Sparge Well Location (approximate)

Building Concrete
 Fence Line Asphalt

Utility Lines
 Underground Gas Line
 Underground Water Line
 Underground Fiber Optics
 Overhead Electric

Utility Pole 0 45 ft
 Manhole Scale

Depth
 OVM PID Reading In PPM·V
Data from WT, Monteverde, Inc., and Intera, Inc.

Depth
 HNU PID Reading In PPM·V
Data From WT, Inc.

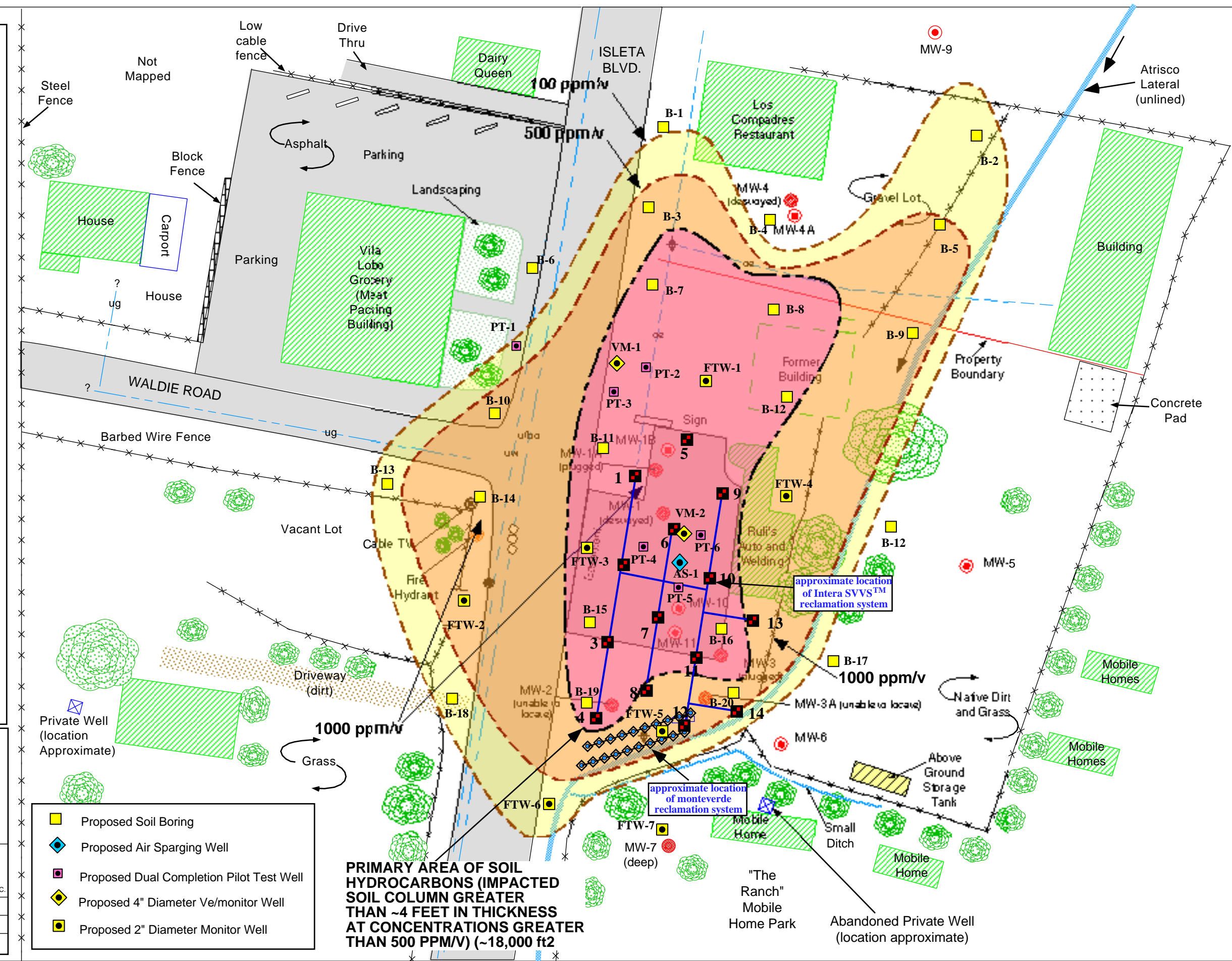
Proposed Drilling and Pilot Test Locations
Old Horn Site
430 Isleta Blvd., SW
Albuquerque, New Mexico

FEI FAITH ENGINEERING, INC.

TECUMSEH
PROFESSIONAL ASSOCIATES, INC.

Drawn by:	WJB	8/99	Client: BCEHD
Drafted by:	ABL	8/99	Job # 035-001
Reviewed by:	WJB	8/99	Figure: 3C

- Proposed Soil Boring
- Proposed Air Sparging Well
- Proposed Dual Completion Pilot Test Well
- Proposed 4" Diameter Ve/monitor Well
- Proposed 2" Diameter Monitor Well



PRIMARY AREA OF SOIL HYDROCARBONS (IMPACTED SOIL COLUMN GREATER THAN ~4 FEET IN THICKNESS AT CONCENTRATIONS GREATER THAN 500 PPM/V) (~18,000 ft²)

approximate location of monteverde reclamation system

approximate location of Intera SVVS™ reclamation system

12/1/95•BJWR	0	NEW MEXICO CORRECTIVE ACTION FUND COST DETAIL FORM — SUMMARY SHEET	
Site Name: Old Horn		Site Address: 430 Isleta SW Albuquerque, NM 87105	
Circle only one:	Circle only one:	Phase 2 — Free Product / Saturated Soil Recovery	Phase 4 — Reclamation Implementation
<input type="checkbox"/> Work plan	<input type="checkbox"/> Claim	<input type="checkbox"/> Phase 1 — Hydrogeo Investigation	<input type="checkbox"/> Phase 3 — Reclamation Proposal
		<input type="checkbox"/> Phase 5 — Operations and Maintenance	
FIXED-PRICE CONTRACT FOR ALL TASKS IN PHASE 1 AND 5		NMED Use Only	
SUMMARY SHEET	TOTAL	Project Manager	Auditor
PROFESSIONAL SERVICES	\$38,680.00		
TAXABLE EXPENSES	\$6,138.00		
TAXABLE SUBCONTRACTORS	\$30,607.50		
TAXABLE SUBTOTAL	\$75,425.50		
NMGRT RATE 5.5625% X TAXABLE SUBTOTAL =	\$4,195.54		
TOTAL	\$79,621.04		
NONTAXABLE EXPENSES			
NONTAXABLE SUBCONTRACTORS			
NONTAXABLE SUBTOTAL			
GRAND TOTAL OF CLAIM	\$79,621.04		

12/1/95•BJWR

NEW MEXICO CORRECTIVE ACTION FUND COST DETAIL FORM — PROFESSIONAL SERVICES

Site Name: Old Horn**Site Address:** 430 Isleta SW
Albuquerque, NM 87105**Circle only one:**☒ **Work plan** ☐ **Claim****Circle only one:**

Minimum Site Assessment

☒ **Phase 1 — Hydrogeo Investigation**Phase 2 — Free Product /
Saturated Soil Recovery

Phase 3 — Reclamation Proposal

Phase 4 — Reclamation Implementation

☐ **Phase 5 — Operations and Maintenance**

FIXED-PRICE CONTRACT FOR ALL TASKS IN PHASE 1 AND 5

NMED Use Only

PROFESSIONAL SERVICES	Invoice #	Rate	Unit	# of Units	Total	Project Manager	Auditor
initial sampling + 3 qtrs gw monitoring					\$12,920.00		
Drilling & Sampling (Hydrogeologic Investigation					\$10,560.00		
Hydrogeologic Report					\$10,080.00		
Pilot Testing					\$5,120.00		
TOTAL UNITS							
SUBTOTAL					\$38,680.00		

NEW MEXICO CORRECTIVE ACTION FUND COST DETAIL FORM — EXPENSES

Site Name: Old Horn

Site Address: 430 Isleta SW
Albuquerque, NM 87105

Circle only one:

☒ **Work plan** ☐ **Claim**

Circle only one:

Minimum Site Assessment

☒ Phase 1 — Hydrogeo InvestigationPhase 2 — Free Product /
Saturated Soil Recovery

Phase 3 — Reclamation Proposal

Phase 4 — Reclamation Implementation

☐ Phase 5 — Operations and Maintenance

FIXED-PRICE CONTRACT FOR ALL TASKS IN PHASE 1 AND 5

NMED Use Only

EXPENSES	Invoice #	Rate	Unit	# of Units	Total	Project Manager	Auditor
NONTAXABLE							
N/A							
NONTAXABLE SUBTOTAL							
TAXABLE							
initial sampling + 3 qtrs gw monitoring					\$2,037.00		
Drilling & Sampling (Hydrogeologic Investigation					\$2,572.00		
Hydrogeologic Report					\$567.00		
Pilot Testing					\$962.00		
TOTAL UNITS							
TAXABLE SUBTOTAL					\$6,138.00		

Site Address: 430 Isleta SW
Albuquerque, NM 87105

Phase 5 — Operations and Maintenance

NMED Use Only

SUBCONTRACTORS	Invoice #	Rate	Unit	# of Units	Total	Project Manager	Auditor
NONTAXABLE							
N/A							
NONTAXABLE SUBTOTAL							
TAXABLE							
initial sampling + 3 qtrs gw monitoring					\$2,131.50		
Drilling & Sampling (Hydrogeologic Investigation					\$24,696.00		
Hydrogeologic Report							
Pilot Testing					\$3,780.00		
TOTAL UNITS							
TAXABLE SUBTOTAL					\$30,607.50		